78

CHANGING CHARACTERISTICS OF HIGH ACCIDENT DRIVERS OVER A FIVE YEAR PERIOD

NOVEMBER 1973 — NUMBER 25

BY

JOHN E. GOODSON

HAROLD L. MICHAEL

JHRP

JOINT HIGHWAY RESEARCH PROJECT

PURDUE UNIVERSITY AND

INDIANA STATE HIGHWAY COMMISSION

Technical Paper

CHANGING CHARACTERISTICS OF HIGH ACCIDENT DRIVERS OVER A FIVE YEAR PERIOD

TO: J. F. McLaughlin, Director
Joint Highway Research Project

November 1, 1973

Project: C-36-590

FROM: H. L. Michael, Associate Director
Joint Highway Research Project

File: 8-5-15

The attached Technical Paper "Changing Characteristics of High Accident Drivers Over a Five Year Period" has been authored by Mr. John E. Goodson, Graduate Assistant in Research on our staff and Professor H. L. Michael, Associate Director. The Paper was presented at the 1973 Annual Purdue Road School and will be published in the Proceedings.

The Paper is a summary of the research report of the same title presented to the Board previously as a Final Report on a JHRP Study. It is presented to the Board now for approval of publication.

Respectfully submitted,

Harold L. Michael

Harold L. Michael
Associate Director

HLM:ms

cc:
W. L. Dolch
R. L. Eskew
G. D. Gibson
W. H. Goetz
M. J. Gutzwiller
G. K. Hallock
R. H. Harrell
M. L. Hayes
C. W. Lovell
G. W. Marks
R. D. Miles
G. T. Satterly
C. F. Scholer
M. B. Scott
J. A. Spooner
N. W. Steinkamp
H. R. J. Walsh
E. J. Yoder

Technical Paper

CHANGING CHARACTERISTICS OF HIGH ACCIDENT DRIVERS OVER A FIVE YEAR PERIOD

by

John E. Goodson
Graduate Assistant in Research

and

Harold L. Michael
Associate Director

Joint Highway Research Project
Project No.: C-36-590
File No.: 8-5-15

Conducted by
Joint Highway Research Project
Engineering Experiment Station
Purdue University

In Cooperation with
Indiana State Highway Commission

Purdue University
West Lafayette, Indiana
November 1, 1973

ABSTRACT

The purpose of this research was to determine the number and characteristics of drivers who had a high accident involvement during a particular year. Then, using information available in the accident and driver record files, the changes in their characteristics and accident involvement during the following four year period were determined.

Accident record summaries were collected for the years 1967 through 1971 for all drivers who were identified as having been involved in three or more accidents during the year 1967. Driver record summaries were collected for drivers involved in three or more accidents during the year 1967 and a total of five or more accidents during the entire five year study period. Included in the final analysis were 776 drivers for which both driver and accident record summaries had been obtained and an additional 1288 drivers for which only accident records were collected.

It was found that the accident records of most of the drivers studied exhibited much improvement during the four year period following the base year. Approximately forty percent of the drivers who were involved in three or more accidents during the base year were identified as having no additional reported accidents during the following four year period.

Using only information available in the accident and driver record files, it was found that it is difficult to predict, with any degree of accuracy, which drivers who were high accident drivers during a particular year would continue to be excessive accident repeaters during following years. Two characteristics studied that appeared to have the greatest value as accident predictors were the number of accidents during a year and the type of license. For the average driver of a high accident group, it was found that as the number of accidents in which he was involved during the base year increased, the probability of his being involved in additional accidents during the following years also increased. Persons with chauffeur's licenses and particularly public passenger chauffeur's licenses were found to occupy a much greater proportion of the high accident groups than their proportions as licensed drivers would indicate.

In general, the accident record of a driver during one year, even when combined with information available in the Indiana Drivers Records, does not enable a reasonable prediction of the drivers accident record for future years.

CHANGING CHARACTERISTICS OF HIGH ACCIDENT DRIVERS OVER A FIVE YEAR PERIOD

Introduction

In order to develop an effective accident prevention program it is necessary to know the characteristics of all of the system components involved: the environment, the vehicle, and the driver. The characteristics that are least understood and the most difficult to predict are those of the individual driver, and it is the driver who is held responsible for the great majority of traffic accidents.

Various research reports in this field have presented contradictory statements regarding the characteristics of drivers involved in accidents. For example, some show that traffic accidents happen to almost everyone, while others indicate that most accidents are the result of voluntary violation of traffic laws, and are subject to correlation with the issuance of citations. Evidence given by Crancer (3,4,5) indicates that it is the non-average driver that is involved in fatal accidents, while Goldstein (6) states that most accidents occur to normal, average people.

Each year a small percentage of drivers are involved in an excessive number of accidents. Very little is known about the characteristics of these drivers or how their accident histories vary over periods of time. In a 1946 report by Johnson (7), it is stated that "Operators who are accident-repeaters in one period tend to regress toward the average of the group in another period." This temporary nature of

accident proneness is further reinforced by more recent reports of Schuster and Guilford (10) and Campbell (1), but is contradicted by Shaw and Sichel (12) who say, "...The man whose past record has been unsatisfactory is unlikely to improve, punishing him will have very little effect, and retraining him means throwing good money after bad. The only practical way of insuring that he does not have accidents is to prevent him from driving."

It is recognized that one method of possibly reducing accidents would be to restrict the driving liberty of those who could be classified as accident repeaters. But to provide such restrictions, good evidence of the benefits to society will be necessary. It would be desirable to know the answer to several questions, for example; Why do some individuals have more accidents than other drivers? Does an individual's relative accident involvement rate in one year remain the same in succeeding years or does it increase or decrease? If improvements or deteriorations are noted, what are the causative factors of these changes?

In 1967 there were about 2.7 million drivers licensed in the State of Indiana. During that year 301,921 drivers were involved in 175,886 reported motor vehicle accidents within the State. During that same year, 2064 drivers were involved in three or more accidents each for a total of 6573 reported accidents. Thus less than one tenth of one percent of the total licensed drivers in Indiana were involved in over 3.7 percent of the accidents that were reported during the year 1667.

While 3.7 percent is not a very large proportion of the total accidents, it is a substantial number. If it could be determined that these high accident drivers were going to continue to become involved in such a large number of accidents during the following years, it would be foolish to allow them to continue as a threat to society. Therefore, this study was directed toward those 2064 individuals who were involved in three or more accidents during the year 1967.

Data were collected for two classes of drivers for the purpose of this study. The first class of drivers included all persons who were identified as being involved in three or more accidents during the year 1967. Complete accident record summaries were collected for each member of this class for the years 1967 through 1971. In addition, driver record summaries were collected for all in this class who had a total of five or more accidents during the five year study period.

The second class of drivers was selected randomly from the entire population of Indiana drivers. This class of drivers was selected to serve as a control to which the multiple accident driver could be compared. Complete accident record summaries and driver record summaries for the years 1967 through 1971 were collected for all drivers in the control class.

It must be reported, however, that the information recorded on the driver and accident records conveys only a small amount of information about that person's driving performance. Furthermore, a driver may continuously violate traffic laws

but will receive a citation which will be recorded on his record only when ticketed by a law enforcement official or perhaps when involved in an accident. A driver may have been involved in many potential accidents (near misses) but was recorded (1967-71) as having an accident only when an accident actually occurred and was reported - required by law if damage was over fifty dollars and/or an injury or fatality occurred. Even then it is probable that some drivers may have had one or more accidents that were unreported.

Final Data Groups

The final 1967 data for which both accident and driver records were available were organized into four groups as follows:

Group	Number of Drivers in Group
Control Group	326
5 Accident Total	361
6-7 Accident Total	288
≥8 Accident Total	127

In addition to the drivers in these four groups, information concerning accident records and age and residence of drivers, but not other driver characteristics was obtained for drivers who had three or four accidents in 1967.

RESULTS

The Accident Picture

As noted, the search of the 1967 accident records produced 2064 drivers who had three or more accidents in Indiana during that year and who are believed to have been Indiana drivers for the five year study period. The number of accidents in which these drivers were involved during that single year ranged from three to nine accidents as shown in Table 1. The group as a whole were involved in a total of 6573 accidents during the year.

Looking at the accident record of this same group of drivers for the entire five year study period, 1967 through 1971, it was found that the number of accidents in which the individual drivers were involved ranged from a low of three, all in 1967, to a high of twenty-nine accidents (see Table 2). The group as a whole were involved in 9269 reported accidents during the entire five year study period.

Taken as a group, it is clear that the accident record of these 2064 drivers underwent much improvement during the four year period following the 1967 base year. In 1967, the group had an average of 3.18 accidents per driver while the average per year for the following four year period was 1.30 accidents per driver. In comparison, the control driver was found to have an average of 0.09 accidents per year. This latter figure is shown in Table 3, a summary of important driver characteristics. Taken as a group, the drivers who had three or more accidents in 1967 showed considerable improvement in their accident record during the following

Table 1. 1967 Multiple Accident Drivers

Number of Accidents Per Driver During The Year 1967	Number of Drivers	Total 1967 Accidents	Total Additional Accidents During Following Four Year Period 1968-1971
3	1763	5289	2102
4	241	964	393
5	46	230	131
6	10	60	56
7	3	21	11
8	0	0	0
9	1	9	3
	2064	6573	2696

Table 2. Total Accident Involvement During Five Year Study Period 1967-1971 By Drivers Involved in Three or More Accidents in 1967.

Total Accidents Per Driver 1967-1971	Number of Drivers	Total Accidents	Total Accidents Per Driver 1967-1971	Cumulative Number of Drivers
3	728	2184	$\geq$ 3	2064
4	560	2240	$\geq$ 4	1336
5	361	1805	$\geq$ 5	776
6	195	1170	$\geq$ 6	415
7	93	651	$\geq$ 7	220
8	50	400	$\geq$ 8	127
9	38	342	$\geq$ 9	77
10	13	130	$\geq$ 10	39
11	9	99	$\geq$ 11	26
12	7	84	$\geq$ 12	17
13	4	52	$\geq$ 13	10
14	2	28	$\geq$ 14	6
15	1	15	$\geq$ 15	4
.				
.				
.				
17	1	17	$\geq$ 17	3
.				
.				
.				
23	1	23	$\geq$ 23	2
.				
.				
.				
29	1	29	$\geq$ 29	1
		9269		

Table 3. Summary Statistics.

Numbers in Parentheses refer to number of drivers, suspensions or violations upon which percentage or mean is based.

	Control Group 326 Drivers	5 Accident Group* 361 Drivers	6-7 Accident Group* 288 Drivers	≥ 8 Accident Group* 127 Drivers
Percent Male	59.2 (193)	95.6 (345)	94.8 (273)	97.6 (124)
Mean Age	38.7	29.6	29.9	32.3
Median Age	36.6	25.1	25.3	27.9
License Type				
Percent Operator	90.5 (295)	70.9 (256)	67.0 (193)	58.3 (74)
Percent Chauffeur	7.7 (25)	24.7 (89)	26.0 (75)	23.6 (30)
Percent Public Passenger Chauffeur	1.8 (6)	4.4 (16)	7.0 (20)	18.1 (23)
Percent of Drivers With One Or More Violation Citations in 1967	4.9 (16)	42.1 (152)	41.0 (118)	45.7 (58)
Mean Number of Violation Citations Per Driver in 1967	0.055 (18)	0.620 (224)	0.670 (193)	0.653 (83)
Percent of Drivers With One or More Serious** Violation Citations in 1967	1.2 (4)	12.5 (45)	13.5 (39)	11.8 (15)
Mean Number of Serious Violation Citations Per Driver in 1967	0.012 (4)	0.161 (58)	0.170 (49)	0.142 (18)
Percent of Drivers With One or More License Suspension in 1967	0.3 (1)	3.0 (11)	2.4 (7)	3.1 (4)
Mean Number of License Suspensions Per Driver in 1967	0.003 (1)	0.050 (18)	0.038 (11)	0.032 (4)

Table 3. (Continued)

	Control Group 326 Drivers	5 Accident Group* 361 Drivers	6-7 Accident Group* 288 Drivers	≥ 8 Accident Group* 127 Drivers
Percent of Drivers With One or More Suspensions for Driving While Intoxicated in 1967	0.3 (1)	1.7 (6)	1.0 (3)	2.4 (3)
Mean Number of Suspensions For Driving While Intoxicated in 1967	0.003 (1)	0.022 (8)	0.010 (3)	0.024 (3)
Percent of Drivers With One or More Suspensions For Failing to Appear in 1967	0 (0)	0.6 (2)	0.7 (2)	0.8 (1)
Mean Number of Suspensions For Failing to Appear in 1967	0 (0)	0.006 (2)	0.007 (2)	0.008 (1)
Percent of Drivers With One or More Suspensions for Leaving the Scene of an Accident in 1967	0 (0)	1.1 (4)	0.7 (2)	0 (0)
Mean Number of Suspensions for Leaving the Scene of an Accident in 1967	0 (0)	0.014 (5)	0.010 (3)	0 (0)
Mean Number of Accidents in 1967	0.080 (26)	3.216 (1161)	3.403 (980)	3.850 (489)
Mean Number of Accidents During Entire Study Period 1967-1971	0.454 (148)	5.000 (1805)	6.323 (1821)	9.578 (1219)

* Total accidents during the five year study period.

** Serious violation refers to a violation with a point count of five or more or a violation that requires mandatory license suspension.

four year period, but they still had more than ten times the number of accidents as the average driver.

Table 4 presents some interesting statistics on the accident picture over the 5-year period of the drivers in the study group. Of the group of 1763 drivers who had three accidents in 1967, 728 or 41.3 percent of the group had no additional accidents during the following four year period. Of that same group, 27.3 percent had only one additional accident and 16.5 percent had two additional accidents during the same four year period.

If all of the 1763 drivers in this study who had three accidents during the year 1967 were prevented from driving during the following four year period, they as a group would not have become involved in 2102 additional accidents that they had during this period.

Of the group of 241 drivers who had four accidents in 1967, 32.8 percent had no additional accidents during the following four year period. Of that same group, 25.7 percent had only one additional accident and 18.7 percent had two additional accidents during the following four year period.

Of the group of forty-six drivers who had five accidents during the year 1967, only eight drivers, or 17.4 percent of the group remained accident free during the following four year period. Of that same group, 21.7 percent had only one additional accident, 26.1 percent had two additional accidents, and 15.2 percent had three additional accidents, all during the same four year period.

Table 4. Number of Accidents in 1967 in Relation to Number of Accidents in the Following Four Year Period 1968-1971.

Number of Additional Accidents During Following Four Year Period 1968-1971	Number of Accidents Per Driver in 1967														
	3			4			5			6			≥ 7		
	Number of Drivers	Percent	Cumulative Percent	Number of Drivers	Percent	Cumulative Percent	Number of Drivers	Percent	Cumulative Percent	Number of Drivers	Percent	Cumulative Percent	Number of Drivers	Percent	Cumulative Percent
0	728	41.3	100.0	79	32.8	100.0	8	17.4	100.0	0	0		0	0	
1	481	27.3	58.7	62	25.7	67.2	10	21.7	82.6	1	10.0	100.0	0	0	
2	291	16.5	31.4	45	18.7	41.5	12	26.1	60.9	4	40.0	90.0	1	25.0	100.0
3	140	7.9	14.9	24	10.0	22.8	7	15.2	34.8	0	0	50.0	2	50.0	75.0
4	56	3.2	7.0	16	6.6	12.8	4	8.7	19.6	2	20.0	50.0	0	0	25.0
5	23	1.3	3.8	5	2.1	6.2	2	4.4	10.9	1	10.0	30.0	0	0	25.0
≥ 6	44	2.5	2.5	10	4.1	4.1	3	6.5	6.5	2	20.0	20.0	1	25.0	25.0
	1763	100.0		241	100.0		46	100.0		10	100.0		4	100.0	

Of the fourteen drivers who were found that had six or more accidents during the year 1967, all had at least one accident during the next four years. Only one, in fact had only one accident. Almost half of the drivers in this group had four or more accidents during this same four year period.

One point is clear from this analysis - the greater number of accidents that a driver has during a particular year increases the probability that he will have additional accidents during the following years.

Another point, however, that is also clear is that one cannot with much accuracy predict who the high-accident drivers of future years are going to be from the high accident drivers of today. Almost 40 percent of those drivers who had three or more accidents in 1967 did not have another accident during the next four years. Denying these 815 drivers the right to drive would have provided no recognizable benefits to society. An additional 551 drivers or 27 percent of the group had only one additional accident during the following four year period.

The average number of accidents per driver over the five year period for the control group was 0.45, in other words the average accident rate of an Indiana driver is about one accident per driver every eleven years. Perhaps one accident during a certain four year period is not too bad a record. Even two accidents in a certain four years might not be considered too unusual. By denying licenses to all drivers who had a total of three or more accidents during the year 1967 1366 individuals who had none or only one accident during the

following four year period would have suffered in order to prevent 698 persons who continued to have a number of accidents from driving and having these accidents.

Similar results would have occurred if 4 or more accidents in 1967 had been chosen as a decision criteria for driver license continuance. More drivers would have been prevented from driving who had no accidents or only one accident during the next four years as drivers who had two or more accidents.

If the criteria of 5 or more accidents in a year would have been used in 1967 only 60 drivers would have lost their license and only 201 accidents would have been prevented over the next 4 years - not a very significant number - but it would have been helpful. But even here, a no-license penalty might be too severe for the 19 of the 60 who had no more than one accident during the following four year period.

In addition to the number of accidents, it might be enlightening to look at the characteristics of high accident drivers. Perhaps then one could better predict who the high accident driver is likely to be and direct safety efforts at him.

The drivers records of each of the high accident drivers and of the control group, therefore, were obtained and available characteristics compared. Characteristics of the accidents of the high accident drivers were also studied. First a few words about these accident characteristics.

Seriousness of the Accidents

State Police records classified accidents into three categories based on the type of accident. These categories in 1967-71 were property damage only for accidents in which fifty dollars or more damage resulted and no one was killed or injured; injury accidents in which someone sustained a personal injury; and fatality accidents in which a death resulted.

Using these three categories as a criterion on which to base the seriousness of an accident, the data indicated (Figure 1) that, in general, the more accidents that a driver has in a year the less serious are the accidents. About twenty-seven percent of the reported accidents in which the three-accident driver group were involved were either injury or fatality accidents. In comparison, less than ten percent of the accidents in which the eight or more accident group were involved were injury or fatality accidents.

Where the Accidents Occurred

A definite relationship was also found between the number of accidents that a driver had and his residence and the location of the accidents (see Figure 2). About thirteen percent of the drivers in the control group were found to reside in Indianapolis while more than twenty percent of the drivers in the five or more accident group resided in Indianapolis. About fourteen percent of the accidents incurred by the drivers of the control group took place in Indianapolis. More than twenty percent of the accidents of the five or more accident driver group occurred in Indianapolis. Over forty-six percent, or nearly half of all accidents in which the

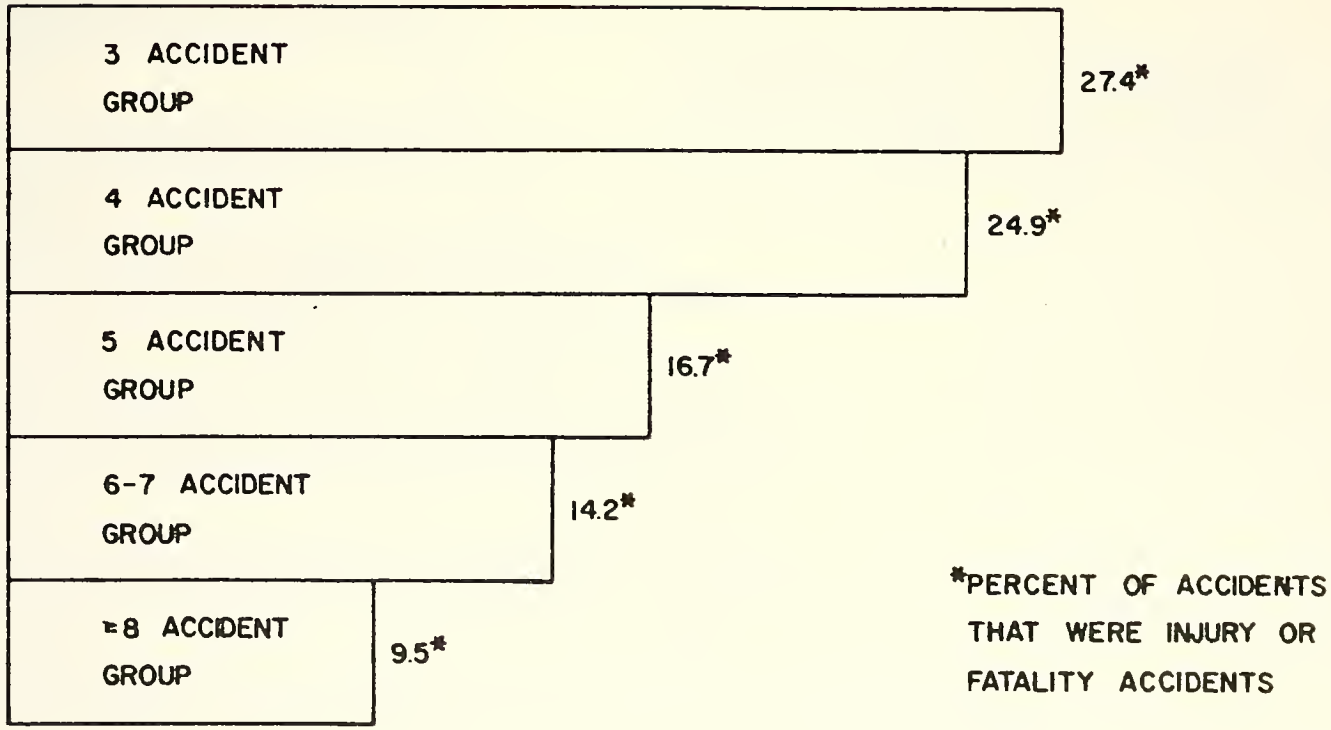

FIGURE 1 SERIOUSNESS OF ACCIDENTS IN RELATION TO TOTAL ACCIDENT INVOLVEMENT

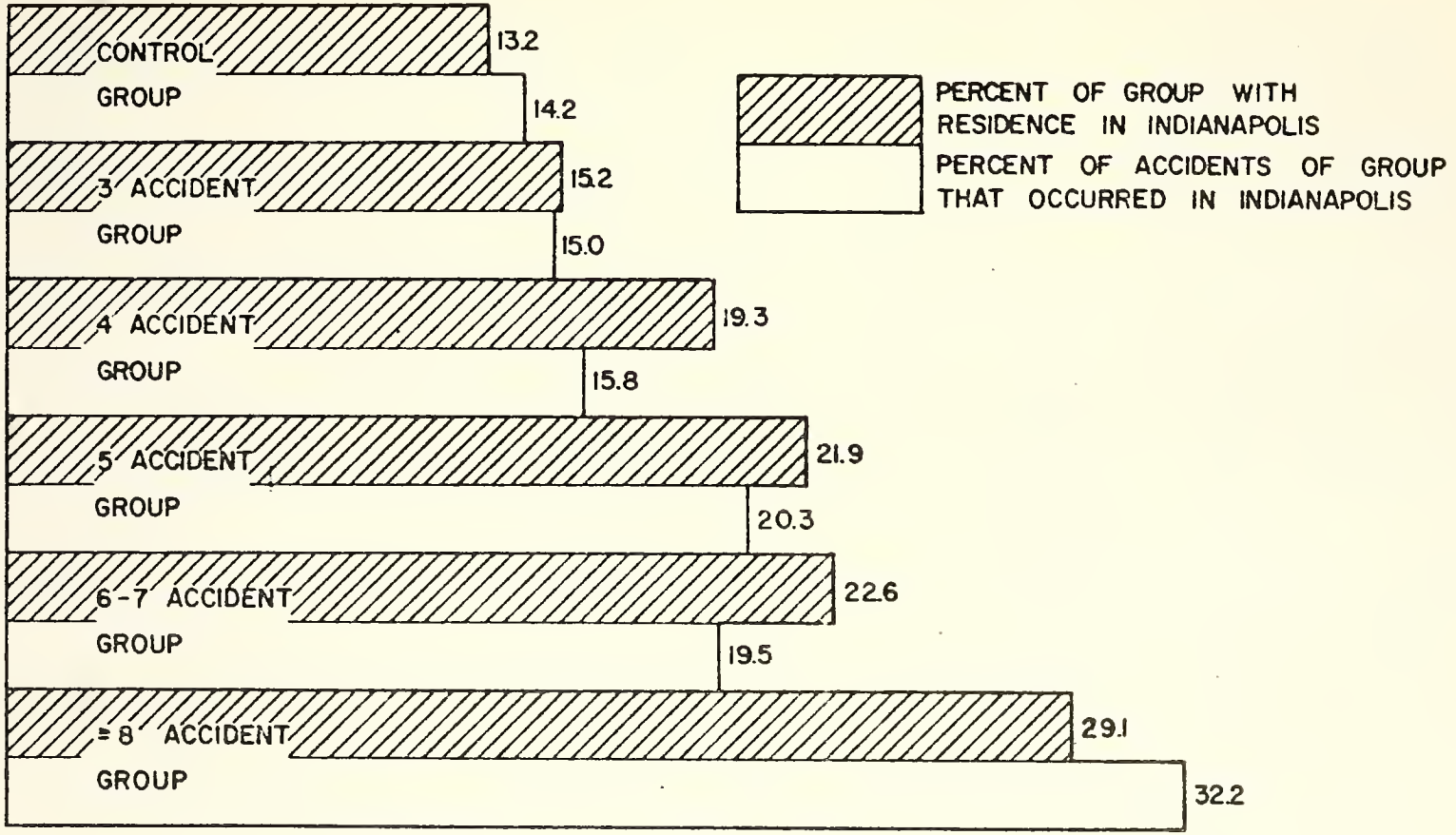

FIGURE 2 RESIDENCE AND ACCIDENT OCCURRENCE IN INDIANAPOLIS IN RELATION TO TOTAL ACCIDENT INVOLVEMENT

drivers of the group who had eight or more accidents were involved occurred either in Fort Wayne or Indianapolis.

These findings seem to suggest that the high accident driver is most likely to be a resident of a large urbanized, more densely populated area. This seems reasonable since there are more vehicles and pedestrians in these areas, more congestion, and thus many more conflicts and opportunities for accidents to occur.

Driver Characteristics

Several personal characteristics of the drivers were available from the driver and accident records. These characteristics included age, sex, and license restrictions.

Age

The high accident driver is, in general, younger than the average driver (see Table 5). The control driver was found to have an average age of 38.65 years. The mean age of the high accident driver ranged from 29.59 years for the five accident group to 32.46 years for the three accident group.

Many studies have noted that certain age groups, most notably the younger drivers, have a higher probability of being involved in accidents. The data from this study agree with this finding. However, this study indicates that age has little value as a predictor of which drivers who are high accident drivers during a particular year will continue to have accidents during the following years.

Table 5. Age Distribution.

Age Groups-Years	Percent of Drivers in Age Groups					
	Control Group	3 Accident Group	4 Accident Group	5 Accident Group	6-7 Accident Group	≥ 8 Accident Group
15	1.5 (5)	0 (0)	0.2 (1)	0.8 (3)	0.4 (1)	0 (0)
16	3.1 (10)	3.8 (28)	4.8 (27)	6.4 (23)	5.2 (15)	3.9 (5)
17	2.8 (9)	7.0 (51)	7.0 (39)	6.1 (22)	8.3 (24)	6.3 (8)
18-19	6.1 (20)	14.7 (107)	13.8 (77)	15.5 (56)	14.9 (43)	11.8 (15)
20-24	11.0 (36)	18.0 (131)	17.3 (97)	19.9 (72)	20.1 (58)	19.7 (25)
25-34	23.3 (76)	19.5 (142)	20.0 (112)	20.8 (75)	20.1 (58)	22.8 (29)
35-44	13.2 (43)	14.8 (108)	14.6 (82)	15.8 (57)	15.7 (45)	12.6 (16)
45-54	19.0 (62)	11.7 (85)	10.2 (57)	8.9 (32)	8.3 (24)	11.8 (15)
55-64	12.6 (41)	6.1 (44)	8.0 (45)	3.6 (13)	4.5 (13)	7.9 (10)
65-74	6.1 (20)	2.6 (19)	2.7 (15)	1.4 (5)	2.1 (6)	3.2 (4)
≥ 75	1.3 (4)	1.8 (13)	1.4 (8)	0.8 (3)	0.4 (1)	0 (0)
	100.0 (326)	100.0 (728)	100.0 (560)	100.0 (361)	100.0 (288)	100.0 (127)
Mean Age	38.65	32.46	32.38	29.58	29.91	32.29
Median Age	36.6	27.5	26.8	25.1	25.3	27.9

The 728 drivers who had three accidents in 1967 and no additional accidents during the following four year period had a mean age of 32.46 years and a median age of 27.5 years as indicated in Table 5. In contrast, the 127 drivers who had eight or more accidents during the five year study period had a mean age of 32.29 years and a median age of 27.9 years. There is less than half a years difference between either the means or medians of the ages of these two driving groups. Clearly the age of the driver who had already had three or more accidents during a particular year will, in most cases, be of little use in predicting whether he will have additional accidents during following years.

While it is well established that male drivers have a greater accident involvement than females, the results of this study are striking. Less than sixty percent of the licensed drivers in Indiana are male; however, male drivers accounted for over ninety-four percent of the drivers with three or more accidents during the year 1967 and a total of five or more accidents during the entire five year study period. Of the 776 drivers in this group of drivers, only thirty-four were female.

License Type

It is unfortunate that no information was available concerning the exposure rate of the drivers under study. The number of miles that a person drives and the circumstances under which they are driven should undoubtedly be an important

consideration in this type of an accident study. It is probable that a person who holds a chauffeur or public passenger chauffeur's license is driving more than the average person with just an operator's license. However, it is also probable that the high accident drivers in this study are not average drivers. It is certainly possible that many of these high accident drivers also travelled many more miles in 1967 and the years following than the average driver with an operator's license.

The statistics of this study indicate that as the number of accidents in which a driver is involved goes up, the probability that he is a holder of either a chauffeur or public passenger chauffeur's license also goes up.

While only 7.7 percent of the control group were drivers with chauffeur's licenses, 23.6 percent of the drivers with eight or more accidents during the five year study period were drivers with chauffeur's licenses. The accident involvement of drivers holding the public passenger chauffeur's license is even more stunning. While they constitute only 1.8 percent of the control group, 18.1 percent of the drivers in the eight or more accident group were public passenger chauffeur's license holders.

This evidence that a high percentage of the drivers who had a high number of accidents during the five year study period hold chauffeur's or public passenger chauffeur's licenses probably provides some explanation of some of the other characteristics of this group. The finding that a high number

of the drivers of this group resided in large urban areas and had accidents there is undoubtedly highly correlated with the license type. Similarly the finding that as the number of accidents increased the seriousness of the accidents decreased probably results from the fact that many of these accidents are in urban areas where speeds are low and congestion great and that those possessing chauffeur's or public passenger chauffeur's licenses are likely driving during these congested conditions.

In fact a pattern of who the very high accident driver is most likely to be, emerges. He is likely to be a young male with a chauffeurs or public passenger chauffeurs license who resides in and drives a lot in the larger urban areas of Indiana and has a large number of property damage accidents each year. Sounds like a taxi driver doesn't it - and it probably is.

The Violation Record

The 1967 violation record of drivers with three or more accidents during the year 1967 and a total of five or more accidents during the entire five year study period appears to be of little use in predicting those drivers that will continue to have accidents. Drivers who had no violation citations in 1967 constituted 54.3 percent of the drivers who had eight or more accidents during the five year study period and 57.9 percent of the drivers who had five accidents during the same period (see Table 6). Those drivers who had two or more violation citations during the year 1967 constituted 13.9 percent of the drivers who had five total

Table 6. 1967 Violation Citations.

Number of Citations in 1967	Control Group			5 Accidents*			6-7 Accidents*			> 8 Accidents*		
	Number of Drivers	Percent	Cumulative Percent	Number of Drivers	Percent	Cumulative Percent	Number of Drivers	Percent	Cumulative Percent	Number of Drivers	Percent	Cumulative Percent
0	310	95.1	100.0	209	57.9	100.0	170	59.0	100.0	69	54.3	100.0
1	14	4.3	4.9	102	28.2	42.1	71	24.7	41.0	40	31.5	45.7
2	2	0.6	0.6	35	9.7	13.9	28	9.7	16.3	13	10.2	14.2
3	0	-	-	12	3.3	4.2	12	4.2	6.6	3	2.4	4.0
4	0	-	-	1	0.3	0.9	5	1.7	2.4	2	1.6	1.6
5	0	-	-	1	0.3	0.6	2	0.7	0.7	0	-	-
6	0	-	-	0	-	0.3	0	-	-	0	-	-
7	0	-	-	1	0.3	0.3	0	-	-	0	-	-
	326	100.0		361	100.0		288	100.0		127	100.0	

* Total accidents during the five year study period.

accidents and 14.2 percent of the drivers who had eight or more total accidents. The percentage of drivers having various numbers of citations from each of the high accident groups is roughly the same, thus making violation citations of little use as a predictor to determine whether a driver who has a number of accidents during a particular year will continue to have accidents during the following years.

The same situation seems to be true of serious violations. The fact that a driver had one or more serious violations during the year 1967 did not have any significant relationship to the number of accidents in which the driver was involved during the following years.

While in many cases the violation record of a driver may be highly correlated to his accident record (2,4,8,11), it appears to be of little use for predicting whether drivers who are high accident drivers during one period will continue to be high accident drivers in the following period.

Case Histories

Finally, the case histories of those drivers who continued to have accidents during the period 1967-1971 were studied in detail, especially those with large numbers of accidents. Two of these cases follow:

Case History A

RESIDENCE: St. Anthony

LICENSE: Operator

AGE: 45

SEX: Male

RESTRICTIONS: None

This driver had a record of four license suspensions, two of which were for driving while intoxicated, during the years 1960 through 1966. His last suspension was still in effect during the first part of the year 1967.

DATE	ACTION	VIOLATION POINTS
5/29/67	Property damage accident	
6/10/67	Reckless driving violation	6
6/10/67	Leaving the scene of an accident violation	
6/10/67	License suspended (1)-leaving the scene of an accident 6/10/67)	
7/01/67	Property damage accident	
7/10/67	Failed to report accident violation	7
7/10/67	Driving while suspended violation	
9/02/67	Injury accident	
10/09/67	Reckless speed violation	6
10/09/67	Driving while intoxicated violation	
10/09/67	Driving while suspended violation	
12/10/67	License suspended (2)-driving while suspended (7/10/67)	
6/10/68	Suspension (2) closed	

DATE	ACTION	VIOLATION POINTS
6/10/68	License suspended (3)-driving while suspended (10/09/67)	
10/21/68	Driving while intoxicated violation	
10/21/68	Driving while suspended violation	
12/10/68	License suspended (4)-driving while intoxicated (10/09/67)	
11/01/69	Property damage accident	
11/01/69	Property damage accident	
11/03/69	Reckless driving violation	6
11/03/69	Driving while suspended violation	
12/10/69	License suspended (5)-driving while intoxicated (10/21/68)	
3/15/70	Driving while intoxicated violation	
3/15/70	Driving while suspended violation	
3/22/70	License suspended (6)-responsible for accident (11/01/69)	
5/21/70	Suspension (6) closed	
12/10/70	License suspended (7)-driving while suspended (10/21/68)	
12/10/71	License suspended (8)-driving while suspended (11/03/69)	
12/14/71	Suspension (7) closed	
12/10/72*	License suspended (9)-driving while intoxicated (3/15/70)	
12/10/73*	License suspended (10)-driving while suspended (3/15/70)	
2/15/72	Current status-suspended until 6/08/74	

*These are dates that the suspensions will automatically go into effect for the past violations listed.

The fact that this driver's license was suspended during the entire five year study period gives emphasis to the need for better controls to prevent unlicensed individuals from driving.

Five year summary:	Total accidents	5
	Total violations	13
	Total violation points	25
	Total suspensions	10

Case History B

RESIDENCE: Indianapolis

LICENSE: Public passenger chauffeur

AGE: 29

SEX: Male

RESTRICTIONS: None

This driver had one violation for speeding for which his license was suspended for one month in 1960.

DATE	ACTION	VIOLATION POINTS
1/20/67	Property damage accident	
6/22/67	Property damage accident	
9/05/67	Property damage accident	
10/26/67	Injury accident	
10/29/67	Property damage accident	
11/11/67	Property damage accident	
3/29/68	Chauffeur license issued	
7/06/68	Property damage accident	
8/29/68	Injury accident	
11/06/68	Property damage accident	

DATE	ACTION	VIOLATION POINTS
1/11/69	Injury accident	
5/30/69	Injury accident	
6/05/69	Property damage accident	
6/17/69	Property damage accident	
7/11/69	Speeding violation-44 mph in 30 mph zone	2
10/25/69	Property damage accident	
12/24/69	Property damage accident	
12/30/69	Property damage accident	
1/02/70	Injury accident	
1/07/70	Property damage accident	
1/21/70	Signal violation	2
1/16/70	Injury accident	
4/14/70	Injury accident	
5/04/70	Property damage accident	
5/18/70	Signal violation-local ordinance	2
6/12/70	Property damage accident	
8/15/70	Injury accident	
9/03/70	Injury accident	
9/18/70	Property damage accident	
11/08/70	Property damage accident	
2/12/71	Property damage accident	
2/18/71	Injury accident	
5/10/71	Operator license issued	
5/11/71	Property damage accident	
6/24/71	Signal violation-local ordinance	2
6/24/71	Signal violation-local ordinance	2
7/09/71	Public passenger chauffeur license issued	
2/10/72	Current status-6 active violation points	

The longest period that this driver was able to go during the five year study period without having an accident was less than six months. During the same period he averaged approximately one accident every two months.

Five year summary:	Total accidents	29
	Total violations	5
	Total violation points	10
	Total suspensions	0

Driver A has clearly been identified as a problem driver. His license was suspended for the entire five year study period. This, however, did not prevent him from driving as he was involved in five reported accidents during this same period.

Driver B was involved in six reported accidents during the year 1967 and a total of 29 during the five year study period. While his violation record is relatively mild compared to other study drivers, he was involved in the most reported accidents of the study.

While these two drivers are extreme examples of problem drivers, there were a few other drivers with very similar records. It is clear that more work is needed both in the identification of such problem drivers and either rehabilitation and effective driving prevention methods for these drivers.

There is some indication that a study of driver and accident records over a period of several years would permit development of a few case histories which would provide a

reasonably accurate prediction of a high future accident involvement. The evidence, however, must be so great that only an extremely small number of drivers could be so rated. Unfortunately, it appears this can be predicted only after they have had numerous accidents and violations. Even if these drivers were removed from the road - which driver license suspension as currently managed does not do - only an extremely small reduction in the accidents in any one year would result.

CONCLUSIONS

The following conclusions concerning high accident drivers summarize the findings of this research.

1. As a group, the accident record of drivers who are involved in three or more accidents during a particular year tends to show much improvement during following years.
2. A large proportion of those drivers who are involved in three or more accidents during a particular year remain accident free during the following four years.
3. Nearly all high accident drivers are male.
4. Drivers with chauffeur's licenses and particularly public passenger chauffeur's licenses account for a large proportion of the individuals who are high accident drivers during one year and continue to be high accident drivers during the following years.

5. High accident drivers are likely to be residents of large urban areas.
6. The violation record of a driver who has a high accident involvement during a particular year has little relationship to his accident record in the following years.
7. In general, the accident record of a driver during one year, even when combined with information available in the Indiana drivers records, does not enable a reasonable prediction of the drivers accident record for future years. In a very few cases, where a history of numerous violations and accidents are recorded, a reasonable prediction of continued high accident involvement can possibly be made.

REFERENCES

1. Campbell, B. J., "Who Really Causes the Accidents?", Signal 99, North Carolina Governor's Highway Safety Program, Vol. 1, No. 2, Spring 1971.

2. Coppin, R. S., Peck, R. C., The 1964 California Driver Record Study, Part 8, The Prediction of Accident Involvement Using Concurrent Driver Record Data, Report No. 20, Research and Statistics Section, California Department of Motor Vehicles, Sacramento, January 1967.

3. Crancer, Alfred, Jr., "Involvement of the Problem Driver in Fatal Motor Vehicle Accidents", Traffic Quarterly, October 1967, pp. 601-610.

4. Crancer, Alfred, Jr., Accident and Violation Rates for Washington Drivers, Washington Department of Motor Vehicles, Olympia, Report No. 003, May 1967.

5. Crancer, Alfred, Jr., McMurray, Lucille, Credit Ratings as a Predictor of Driving Behavior and Improvement, Washington Department of Motor Vehicles, Olympia, Report No. 010, May 1968.

6. Goldstein, Leon G., "Psychological Aspects of Traffic Accidents", Traffic Digest and Review, Vol. 12, No. 6, July 1964, pp. 10-12, 23.

7. Johnson, H. M., "The Detection and Treatment of Accident Prone Drivers", Psychological Bulletin, No. 43, 1946, pp. 489-533.

8. O'Neall, P. A., Relationship of Accident Involvement and Number of Citations: 1966 Data, Washington Department of Motor Vehicles, Olympia, Report No. 006, 1967.

9. Penn, H. S., Causes and Characteristics of Single Car Accidents, Parts 3 & 4, California Highway Patrol, Sacramento, January 1965.

10. Schuster, D. H., Guilford, J.P., An Analysis of Accident Repeater and Chronic Violater Drivers, Traffic Project Report No. 1, U.S. Public Health Grant M-2353, Los Angeles, California, 1956.

11. Schuster, D. H., "Prediction of Follow-up Driving Accidents and Violations", Research Review, March 1968, pp. 17-21.

12. Shaw, L., Sichel, H. S., "The Reduction of Accidents in a Transport Company by the Determination of the Accident Liability of Individual Drivers", Research Review, December 1961.

13. Waller, Julian A., "Traffic Accidents, A Medical Viewpoint, Part 1", Automotive Industries, Vol. 136, No. 8, April 15, 1967, pp. 87-90.